LightSAR: A High-Performance, Lightweight, imaging Radar Mission

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ABSTRACT

LightSAR is a proposed free-flying, llarth-observing, lightweight, synthetic aperture radar (SAR) mission. It is part of NASA's long term investment in the development and prosperous usc of imaging radar science and technology in the public and private sector. Past spaceborne radar missions have established the vast potential of imaging radar for expanding scientific knowledge of the Earth and planets. LightSAR is an affordable leap forward that will deliver exciting Earth science data, demonstrate valuable new technologies, and lead the next level of expansion for the U.S. commercial remote sensing industry.

LightSAR's all-weather, day-night remote sensing capability will result in numerous scientifically valuable and commercially lucrative applications. For example, LightSAR has the unique capability to continuously monitor minute changes in the Earth's surface (to the millimeter level), which can lead to improved understanding of earthquakes and volcanoes, while supporting emergency management efforts. Studying the movements and changing size of glaciers and ice floes will support long-term climate variability studies. LightSAR's 1 to 3 meter high-resolution capability has significant commercial potential for topographic mapping, crop monitoring, and land management, planning and development.

JPL is leading the development of LightSAR for NASA, in collaboration with NASA Stennis Space Center and four industry teams, to establish complementary ways of jointly fulfilling strategic science and commercial remote sensing needs. A major goal is to design, develop and launch by the year 2001, a high-performance SAR spacecraft for about a factor of 4 lower cost than that of previous free-ftying SAR missions (including launch services). These cost reductions will be achieved by combining the usc of advanced technologies, commercial spacecraft, launch vehicle, and operations practices, services and infrastructures, and a "faster, better, cheaper" management approach. Technology developments incorporated in the SAR payload include advanced microelectronics and lightweight materials that enable significant performance enhancements relative to previous SAR instruments, at a total payload mass of' under 250 kg. This low mass enables the LightSAR spacecraft to be launched on a Taurus Xl, or LMLV-2 class launchvehicle.

This paper summarizes the LightSAR concept, program status, and future plans.

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